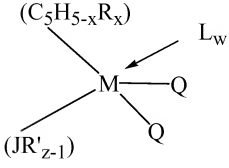
LISTING OF CLAIMS

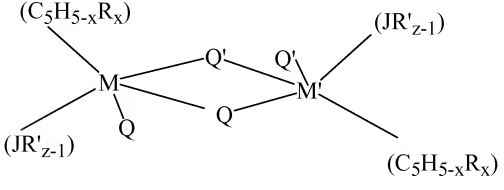
This listing of claims will replace all prior versions and listings of claims in the application:

1. - 26. (Cancelled)

27. (Previously Presented) A compound having the general formula:



or



wherein M is Zr, Hf or Ti;

$(C_5H_{5-x}R_x)$ is a cyclopentadienyl ring which is substituted with from zero to five substituent groups R, x is 0, 1, 2, 3, 4 or 5 denoting the degree of substitution, and each substituent group R is, independently, a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more

hydrogen atoms is replaced by a halogen atom, C_1-C_{20} hydrocarbyl-substituted metalloid radicals wherein the metalloid is selected from the group IV A of the Periodic Table of Elements, and halogen radicals, or ($C_5H_{5-x}R_x$) is a cyclopentadienyl ring in which two adjacent R groups are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'$_{z-1}$) is a heteroatom ligand in which J is an element with a coordination number of three from Group V-A of the Periodic Table of Elements, each R' is, independently, a radical selected from a group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals where one or more hydrogen atoms is replaced by a halogen radical, and z is the coordination number of the element J;

each Q is, independently, selected from the group consisting of halogen, hydride or C_1-C_{20} hydrocarbyl, provided that Q is different from ($C_5H_{5-x}R_x$);

L is a neutral Lewis base where "w" is a number greater than 0 and up to 3;

M' has the same meaning as M; and

Q' has the same meaning as Q.

28. - 43. (Cancelled)

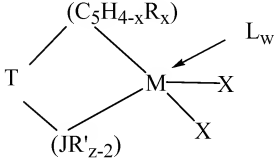
44. (Previously Presented) The compound of claim 27 wherein each Q is independently selected from the group consisting of halogen, hydride and C_1-C_{20} hydrocarbyl.

45. (Previously Presented) The compound of claim 27 wherein each Q is independently selected from the group consisting of hydride, methyl, ethyl, propyl, butyl, amyl, hexyl, heptyl, octyl, nonyl, decyl, cetyl, phenyl, chloro, bromo, fluoro, and iodo.

46. (Previously Presented) The compound of claim 27 wherein M is Zr.

47. (Previously Presented) The compound of claim 27 wherein M is Hf.

48. (Currently Amended) A compound having the general formula



or a dimer thereof, wherein:

M is Zr, Hf, or Ti;

$(C_5H_{4-x}R_x)$ is a cyclopentadienyl ring which is substituted with from zero to four substituent groups R, x is 0, 1, 2, 3, or 4 denoting the degree of substitution, provided that x is 0, 1, 2, ~~3or 4~~ 3 or 4 when M is Ti and x is 0, 1 or 3 when M is Hf or Zr ~~or Z~~, and each substituent group R is, independently, a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, C_1-C_{20} hydrocarbyl-substituted metalloid radicals wherein the metalloid is selected from the group consisting of silicon and germanium, cyano, and halogen radicals, or $(C_5H_{4-x}R_x)$ is a cyclopentadienyl ring in which two adjacent R groups are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'_{z-2}) is a heteroatom ligand in which J is an element with a coordination number of three from Group V-A or an element with a coordination number of two from Group VI-A of the Periodic Table of Elements, and R' is a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, and z is the coordination number of the element J;

X is, independently each occurrence, an anionic ligand group selected from the group consisting of hydride, halide, alkyl of up to 30 carbon atoms, alkoxy having up to a total of 30 carbon atoms and oxygen atoms, cyanide, azide, acetylacetonate, aryl having from 6 to 30 carbon atoms, aryl oxy having a total of from 7 to 30 carbon and oxygen atoms, norbornyl and benzyl;

T is CR_2*, CR_2*CR_2*, SiR_2* or SiR_2*SiR_2*, where R* is selected from the group consisting of hydrogen, C_1 to C_{20}-alkyl, haloaklyl having up to a total of 20 carbon and halogen atoms, aryl having from 6 to 20 carbon atoms, and haloaryl having a total of from 7 to 20 carbon and halogen atoms; and

L is a neutral Lewis base; and w is a number from 0 to 3.

49. (Previously Presented) The compound of claim 48 wherein each X is independently selected from the group consisting of halide, hydride and alkyl of up to 30 carbon atoms.

50. (Previously Presented) The compound of claim 48 wherein each X is independently selected from the group consisting of hydride, methyl, ethyl, propyl, butyl, amyl, hexyl, heptyl, octyl, nonyl, decyl, cetyl, phenyl, chloro, bromo, fluoro, and iodo.

51. (Previously Presented) The compound of claim 48 wherein M is Zr.

52. (Previously Presented) The compound of claim 48 wherein M is Hf.

53. (Cancelled)

54. (Previously Presented) The compound of claim 48 wherein J is oxygen, phosphorus, or sulfur.

55. (Previously Presented) The compound of claim 48 wherein J is nitrogen and T is CR_2* or CR_2*CR_2*, where R* is selected from the group consisting of

hydrogen, C_1 to C_{20}-alkyl, haloaklyl having up to a total of 20 carbon and halogen atoms, aryl having from 6 to 20 carbon atoms, and haloaryl having a total of from 7 to 20 carbon and halogen atoms.

56. (Previously Presented) The compound of claim 48 wherein $(C_5H_{4-x}R_x)$ is tetrahydroindenyl, fluorenyl, or octahydrofluorenyl.

57. - 59. (Cancelled)

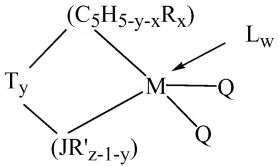
60. (Previously Presented) The compound of claim 48 wherein T is methylene or ethylene.

61. (Previously Presented) The compound of claim 48 wherein T is dimethylsilyl.

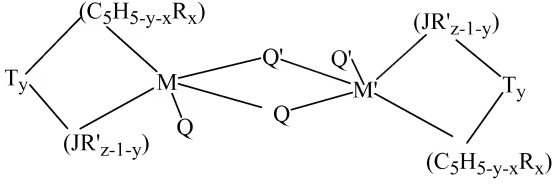
62. (Previously Presented) The compound of claim 48 wherein T is diphenylsilyl.

63. (Previously Presented) The compound of claim 48 wherein X is a halide.

64. (Currently Amended) A compound having the general formula



or



wherein M is Zr, Hf, or Ti;

M' has the same meaning as M;

$(C_5H_{5-y-x}R_x)$ is a cyclopentadienyl ring which is substituted with from zero to five substituent groups R, x is 0, 1, 2, 3, 4 or 5 denoting the degree of substitution, wherein x is 0, 1, 2, ~~3or 4~~ 3 or 4 when M is Ti and x is 0, 1 or 3 when M is Hf or Zr, and each substituent group R is, independently, a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, C_1-C_{20} hydrocarbyl-substituted metalloid radicals wherein the metalloid is selected from the group IV A of the Periodic Table of Elements and halogen radicals, or $(C_5H_{5-y-x}R_x)$ is a cyclopentadienyl ring in which two adjacent R substituents are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'_{z-1-y}) is a heteroatom ligand in which J is nitrogen, phosphorus, oxygen, or sulfur, and R' is a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals where one or more hydrogen atoms is replaced by a halogen radical, and z is 3 when J is nitrogen or phosphorus or z is 2 when J is oxygen or sulfur;

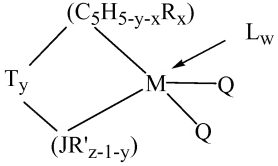
each Q is, independently, a univalent anionic ligand or two Q's together are a divalent anionic chelating ligand, provided that Q is not a substituted or unsubstituted cyclopentadienyl ring;

Q' has the same meaning as Q;

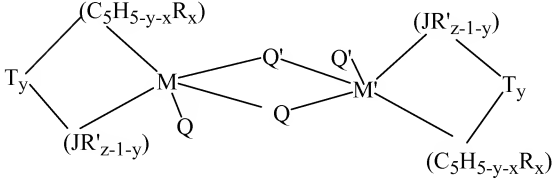
y is 0 or 1 when w is greater than 0; T is a covalent bridging group containing a Group IV-A or V-A element; and

L is a neutral Lewis base, where w denotes the number 0 or 1, and when w is 0 y is 1.

65. (Currently Amended) A compound having the general formula



or



wherein M is Zr, Hf, or Ti;

M' has the same meaning as M;

$(C_5H_{5-y-x}R_x)$ is a cyclopentadienyl ring which is substituted with from zero to five substituent groups R, x is 0, 1, 2, 3, 4 or 5 denoting the degree of substitution, wherein x is 0, 1, 2, ~~3 or 4~~ 3 or 4 when M is Ti and x is 0, 1 or 3 when M is Hf or Zr, and each substituent group R is, independently, a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, C_1-C_{20} hydrocarbyl-substituted metalloid radicals wherein the metalloid is selected from the group IV A of the Periodic Table of Elements and halogen radicals, or $(C_5H_{5-y-x}R_x)$ is a cyclopentadienyl ring in which two adjacent R substituents are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'_{z-1-y}) is a heteroatom ligand in which J is nitrogen, and R' is a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals where one or more hydrogen atoms is replaced by a halogen radical, and z is 3;

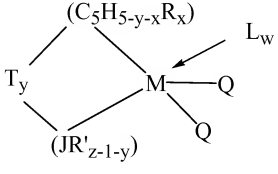
each Q is, independently, a univalent anionic ligand or two Q's together are a divalent anionic chelating ligand, provided that Q is not a substituted or unsubstituted cyclopentadienyl ring;

Q' has the same meaning as Q;

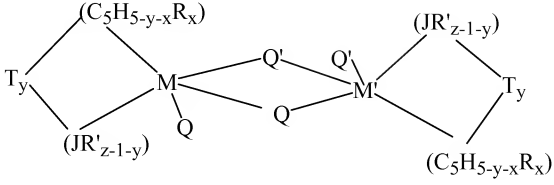
y is 0 or 1 when w is greater than 0; T is a covalent bridging group containing a Group IV-A or V-A element; and

L is a neutral Lewis base, where w denotes the number 0 or 1, and when w is 0 y is 1.

66. (Currently Amended) A compound having the general formula



or



wherein M is Zr, or Hf;

M' has the same meaning as M;

$(C_5H_{5-y-x}R_x)$ is a cyclopentadienyl ring which is substituted with from zero to five substituent groups R, x is 0, 1, 2, 3, 4 or 5 denoting the degree of substitution, wherein ~~x is 0, 1, 2, 3or 4 when M is Ti and~~ x is 0, 1 or 3 ~~when M is Hf or Zr~~, and each substituent group R is, independently, a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, C_1-C_{20} hydrocarbyl-substituted metalloid radicals wherein the metalloid is selected from the group IV A of the Periodic Table of Elements and halogen radicals, or $(C_5H_{5-y-x}R_x)$ is a cyclopentadienyl ring in which two adjacent R substituents are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'_{z-1-y}) is a heteroatom ligand in which J is an element with a coordination number of three from Group V-A or an element with a coordination number of two from Group VI-A of the Periodic Table of Elements, and each R' is a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals where one or more hydrogen atoms is replaced by a halogen radical, and z is the coordination number of the element J;

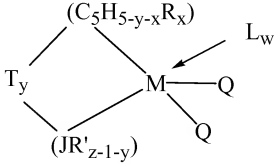
each Q is, independently, a univalent anionic ligand or two Q's together are a divalent anionic chelating ligand, provided that Q is not a substituted or unsubstituted cyclopentadienyl ring;

Q' has the same meaning as Q;

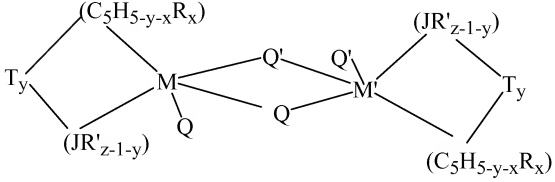
y is 0 or 1 when w is greater than 0; T is a covalent bridging group containing a Group IV-A or V-A element; and

L is a neutral Lewis base, where w denotes the number 0 or 1, and when w is 0 y is 1.

67. (Currently Amended) A compound having the general formula



or



wherein M is Ti, Zr, or Hf;

M' has the same meaning as M;

($C_5H_{5-y-x}R_x$) is a cyclopentadienyl ring which is substituted with from zero to five substituent groups R, x is 0, 1, 2, 3, 4 or 5 denoting the degree of substitution, wherein x is 0, 1, 2, ~~3or 4~~ 3 or 4 when M is Ti and x is 0, 1 or 3 when M is Hf or Zr, and each substituent group R is, independently, a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, C_1-C_{20} hydrocarbyl-substituted metalloid radicals wherein the metalloid is selected from the group IV A of the Periodic Table of Elements and halogen radicals, or ($C_5H_{5-y-x}R_x$) is a cyclopentadienyl ring in which two adjacent R substituents are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'_{z-1-y}) is a heteroatom ligand in which J is an element with a coordination number of three from Group V-A or an element with a coordination number of two from Group VI-A of the Periodic Table of Elements, and each R' is a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals where one or more hydrogen atoms is replaced by a halogen radical, and z is the coordination number of the element J;

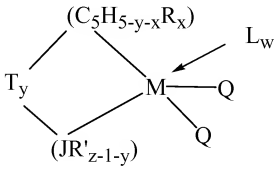
each Q is independently selected from the group consisting of halogen, hydride or a substituted or unsubstituted C_1-C_{20} hydrocarbyl, alkoxide, aryloxide, amide, arylamide, phosphide, or arylphosphide, provided that provided that Q is not a substituted or unsubstituted cyclopentadienyl ring, or both Q together are an alkylidene or a cyclometallated hydrocarbyl;

Q' has the same meaning as Q;

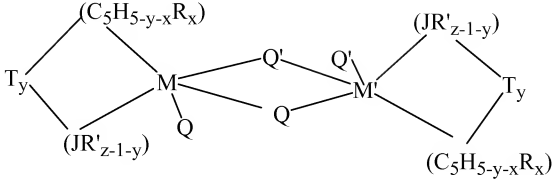
y is 0 or 1 when w is greater than 0; T is a covalent bridging group containing a Group IV-A or V-A element; and

L is a neutral Lewis base, where w denotes the number 0 or 1, and when w is 0 y is 1.

68. (Currently Amended) A compound having the general formula



or



wherein M is Zr, Hf, or Ti;

M' has the same meaning as M;

$(C_5H_{5-y-x}R_x)$ is a cyclopentadienyl ring which is substituted with from zero to five substituent groups R, x is 0, 1, 2, 3, 4 or 5 denoting the degree of substitution, wherein x is 0, 1, 2, ~~3or 4~~ 3 or 4 when M is Ti and x is 0, 1 or 3 when M is Hf or Zr, and each substituent group R is, independently, a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, C_1-C_{20} hydrocarbyl-substituted metalloid radicals wherein the metalloid is selected from the group IV A of the Periodic Table of Elements or $(C_5H_{5-y-x}R_x)$ is a cyclopentadienyl ring in which two adjacent R groups are

joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'_{z-1-y}) is a heteroatom ligand in which J is an element with a coordination number of three from Group V-A or an element with a coordination number of two from Group VI-A of the Periodic Table of Elements, and each R' is a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals where one or more hydrogen atoms is replaced by a halogen atom, and z is the coordination number of the element J;

each Q is, independently, a univalent anionic ligand or two Q's together are a divalent anionic chelating ligand, provided that Q is not a substituted or unsubstituted cyclopentadienyl ring;

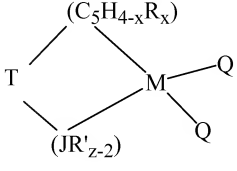
Q' has the same meaning as Q;

y is 0 or 1 when w is greater than 0, y is 1 when w is 0; T is a covalent bridging group containing a Group IV-A or V-A element and

L is a Lewis base; where w denotes a number from 0 to 3.

69. (Previously Presented) The compound of claim 68 wherein each Q is a halogen or hydrocarbyl radical.

70. (Currently Amended) A compound represented by general formula



M is Zr, Hf, or Ti;

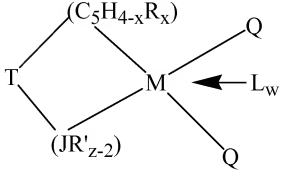
$(C_5H_{4-x}R_x)$ is a cyclopentadienyl ring which is substituted with from zero to four substituent groups R, x is 0, 1, 2, 3, or 4 denoting the degree of substitution, wherein x is 0, 1, 2, ~~3or 4~~ 3 or 4 when M is Ti and x is 0, 1 or 3 when M is Hf or Zr, and each substituent group R is, independently, a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, and halogen radicals, or $(C_5H_{4-x}R_x)$ is a cyclopentadienyl ring in which two adjacent R substituents are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'_{z-2}) is a heteroatom ligand in which J is an element with a coordination number of three from Group V-A, and R' is a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals where one or more hydrogen atoms is replaced by a halogen radical, and z is 3;

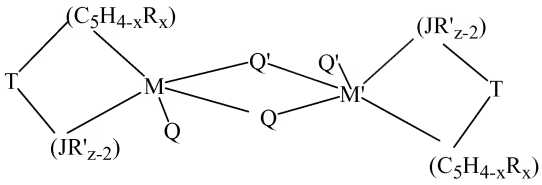
each Q is, independently, a univalent anionic ligand group or two Q's together are a divalent anionic chelating ligand, provided that Q is not a substituted or unsubstituted cyclopentadienyl ring; and

T is a covalent bridging group containing a Group IV-A or V-A element.

71. (Currently Amended) A compound having the general formula:



or



wherein M is Zr, Hf, or Ti;

M' has the same meaning as M;

$(C_5H_{4-x}R_x)$ is a cyclopentadienyl ring which is substituted with from zero to four substituent groups R, x is 0, 1, 2, 3, or 4 denoting the degree of substitution, wherein x is 0, 1, 2, ~~3or 4~~ 3 or 4 when M is Ti and x is 0, 1 or 3 when M is Hf or Zr, and each substituent group R is, independently, a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, and halogen radicals, or $(C_5H_{4-x}R_x)$ is a cyclopentadienyl ring in which two adjacent R substituents are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'_{z-2}) is a heteroatom ligand in which J is an element with a coordination number of three from Group V-A or an element with a coordination number of two from Group VI-A of the Periodic Table of Elements, and R' is a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals where one or more hydrogen atoms is replaced by a halogen radical, and z is the coordination number of the element J;

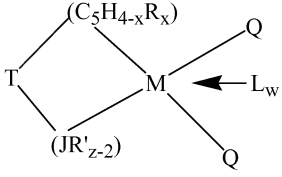
each Q is, independently, a univalent anionic ligand or two Q's together are a divalent anionic chelating ligand, provided that Q is not a substituted or unsubstituted cyclopentadienyl ring;

Q' has the same meaning as Q;

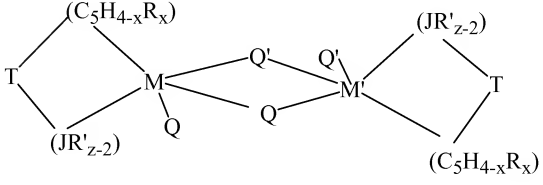
T is a covalent bridging group selected from the group consisting of dialkyl, alkylaryl, or diaryl substituted silicon or germanium radicals; and

L is a neutral Lewis base where w denotes the number 0 or 1.

72. (Currently Amended) A compound having the general formula:



or



wherein M is Zr, Hf, or Ti;

M' has the same meaning as M;

$(C_5H_{4-x}R_x)$ is a cyclopentadienyl ring which is substituted with from zero to four substituent groups R, x is 0, 1, 2, 3, or 4 denoting the degree of substitution, wherein x is 0, 1, 2, ~~3 or 4~~ 3 or 4 when M is Ti and x is 0, 1 or 3 when M is Hf or Zr, and each substituent group R is, independently, a radical selected from the group consisting of C_1-

C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, and halogen radicals, or $(C_5H_{4-x}R_x)$ is a cyclopentadienyl ring in which two adjacent R substituents are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'_{z-2}) is a heteroatom ligand in which J is an element with a coordination number of three from Group V-A or an element with a coordination number of two from Group VI-A of the Periodic Table of Elements, and R' is a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals where one or more hydrogen atoms is replaced by a halogen radical, and z is the coordination number of the element J;

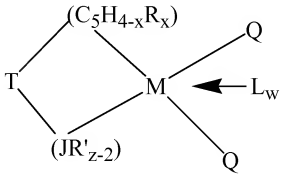
each Q is, independently, a univalent anionic ligand or two Q's together are a divalent anionic chelating ligand, provided that Q is not a substituted or unsubstituted cyclopentadienyl ring;

Q' has the same meaning as Q;

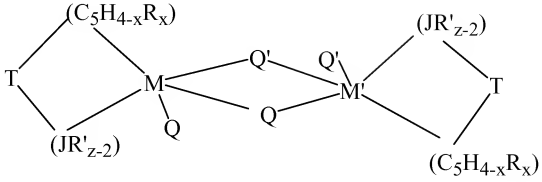
T is a covalent bridging group selected from the group consisting of substituted or unsubstituted methylene or ethylene radicals; and

L is a neutral Lewis base where w denotes the number 0 or 1.

73. (Currently Amended) A compound having the general formula:



or



wherein M is Zr, Hf, or Ti;

M' has the same meaning as M;

$(C_5H_{4-x}R_x)$ is a cyclopentadienyl ring which is substituted with from zero to four substituent groups R, x is 0, 1, 2, 3, or 4 denoting the degree of substitution, wherein x is 0, 1, 2, ~~3or 4~~ 3 or 4 when M is Ti and x is 0, 1 or 3 when M is Hf or Zr, and each substituent group R is, independently, a radical selected from the group consisting of methyl, ethyl, propyl, butyl, octyl, benzyl, phenyl, trimethylgermyl, trimethylstannyl, triethylplumbyl, trifluoromethyl, trimethylsilyl, triethylsilyl, ethyldimethylsilyl, methyldiethylsilyl, and triphenylgermyl, or $(C_5H_{4-x}R_x)$ is a cyclopentadienyl ring in which two adjacent R substituents are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'_{z-2}) is a heteroatom ligand selected from the group consisting of *t*-butylamido, phenylamido, p-*n*-butylphenylamido, cyclohexylamido, perfluorophenylamido, *n*-butylamido, methylamido, ethylamido, *n*-propylamido, isopropylamido, benzylamido, *t*-butylphosphido, ethylphosphido, phenylphosphido, and cyclohexylphosphido, and z is 3;

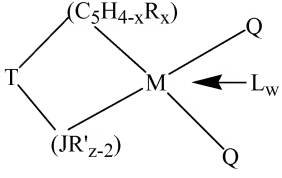
each Q is, independently, selected from the group consisting of hydride, methyl, ethyl, propyl, butyl, amyl, hexyl, heptyl, octyl, nonyl, decyl, cetyl, phenyl, chloro, bromo, fluoro, iodo, methoxy, ethoxy, propoxy, butoxy, phenoxy, methylphenoxy, dimethylamido, diethyolamido, methylethylamido, dibutylamido, dipropylamido, diphenylamido, diphenylphosphido, dicyclohexylphosphido, diethylphosphido, and dimethylphosphido;

Q' has the same meaning as Q;

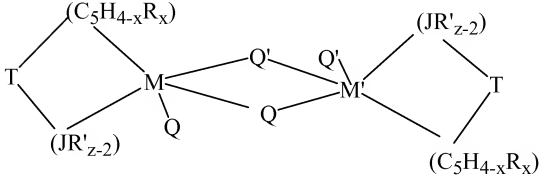
T is a covalent bridging group selected from the group consisting of dimethylsilyl, diethylsilyl, di-*n*-propylsilyl, diisopropylsilyl, di-*n*-butylsilyl, di-*t*-butylsilyl, di-*n*-hexylsilyl, methylphenylsilyl, ethylmethylsilyl, diphenylsilyl, *n*-hexylmethylsilyl, cyclopentamethylenesilyl, cyclotetramethylenesilyl, cyclotrimethylenesilyl, dimethylgermyl, and diethylgermyl; and

L is a neutral Lewis base where w denotes the number 0 or 1.

74. (Currently Amended) A compound having the general formula:



or



wherein M is Zr, Hf, or Ti;

M' has the same meaning as M;

($C_5H_{4-x}R_x$) is a cyclopentadienyl ring which is substituted with from zero to four substituent groups R, x is 0, 1, 2, 3, or 4 denoting the degree of substitution, wherein x is 0, 1, 2, ~~3or 4~~ 3 or 4 when M is Ti and x is 0, 1 or 3 when M is Hf or Zr, and each substituent group R is, independently, a radical selected from the group consisting of methyl, ethyl, propyl, butyl, octyl, benzyl, phenyl, trimethylgermyl, trimethylstannyl, triethylplumbyl, trifluoromethyl, trimethylsilyl, triethylsilyl, ethyldimethylsilyl, methyldiethylsilyl, and triphenylgermyl, or ($C_5H_{4-x}R_x$) is a cyclopentadienyl ring in which two adjacent R substituents are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'_{z-2}) is a heteroatom ligand selected from the group consisting of *t*-butylamido, phenylamido, p-*n*-butylphenylamido, cyclohexylamido, perfluorophenylamido, *n*-butylamido, methylamido, ethylamido, *n*-propylamido, isopropylamido, benzylamido, *t*-butylphosphido, ethylphosphido, phenylphosphido, and cyclohexylphosphido, and z is 3;

each Q is, independently, selected from the group consisting of hydride, methyl, ethyl, propyl, butyl, amyl, hexyl, heptyl, octyl, nonyl, decyl, cetyl, phenyl, chloro, bromo, fluoro, iodo, methoxy, ethoxy, propoxy, butoxy, phenoxy, methylphenoxy, dimethylamido, diethyolamido, methylethylamido,dibutylamido, dipropylamido, diphenylamido, diphenylphosphido, dicyclohexylphosphido, diethylphosphido, and dimethylphosphido;

Q' has the same meaning as Q;

T is a covalent bridging group selected from the group consisting of methylene, dimethylmethylene, diethylmethylene, ethylene, dimethylethylene, diethylmethylene, and dipropylethylene; and

L is a neutral Lewis base where w denotes the number 0 or 1.

75. (Cancelled)

76. (Cancelled)

77. (Previously Presented) The compound of claim 70 wherein Q is independently selected from the group consisting of halogen, hydride and C_1 to C_{20} hydrocarbyl.

78. (Previously Presented) The compound of claim 71 wherein Q is independently selected from the group consisting of halogen, hydride or C_1 to C_{20} hydrocarbyl.

79. (Previously Presented) The compound of claim 72 wherein Q is independently selected from the group consisting of halogen, hydride or C_1 to C_{20} hydrocarbyl.

80. (Previously Presented) The compound of claim 70 wherein each Q is independently selected from the group consisting of hydride, methyl, ethyl, propyl, butyl, amyl, hexyl, heptyl, octyl, nonyl, decyl, cetyl, phenyl, chloro, bromo, and iodo.

81. (Previously Presented) The compound of claim 71 wherein each Q is independently selected from the group consisting of hydride, methyl, ethyl, propyl, butyl, amyl, hexyl, heptyl, octyl, nonyl, decyl, cetyl, phenyl, chloro, bromo, and iodo.

82. (Previously Presented) The compound of claim 72 wherein each Q is independently selected from the group consisting of hydride, methyl, ethyl, propyl, butyl, amyl, hexyl, heptyl, octyl, nonyl, decyl, cetyl, phenyl, chloro, bromo, and iodo.

83. (Previously Presented) A process for the polymerization of one or more alpha olefins comprising conducting the polymerization in the presence of a catalyst system comprising (A) the compound of claim 48 and (B) an alumoxane.

84. (Previously Presented) The process of claim 83 wherein the mole ratio of Al:M is from 10:1 to 20,000:1.

85. (Previously Presented) The process of claim 83 wherein the one or more alpha olefins is ethylene.

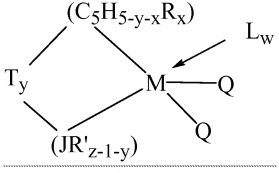
86. (Previously Presented) The process of claim 83 wherein the one or more alpha olefins is propylene.

87. (Previously Presented) The process of claim 83 wherein the one or more alpha olefins is (1) ethylene in combination with an alpha olefin having 3 to 20 carbon atoms, (2) propylene in combination with ethylene and/or C4 or higher alpha-olefins and diolefins, or (3) butene in combination with ethylene and/or C4 or higher alpha-olefins and diolefins.

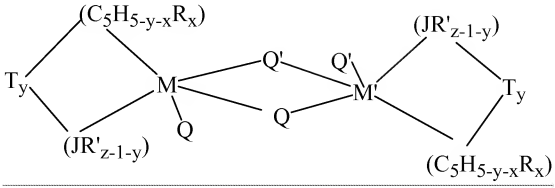
88. - 98. (Cancelled)

99. (Currently Amended) ~~The process of claim 88 wherein the olefin is styrene.~~ A process for the polymerization of one or more alpha olefins comprising conducting the polymerization in the presence of a catalyst system comprising:

(A) a Group IV B transition metal component of the formula:



or



wherein M is Zr, Hf or Ti;

M' has the same meaning as M;

$(C_5H_{5-y-x}R_x)$ is a cyclopentadienyl ring which is substituted with from zero to five groups R, x is 0, 1, 2, 3, 4 or 5 denoting the degree of substitution, wherein x is 0, 1, 2, 3 or 4 when M is Ti and x is 0, 1 or 3 when M is Hf or Zr, and

each R is, independently, a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, C_1-C_{20} hydrocarbyl-substituted metalloid radicals wherein the metalloid is selected from the Group IV A of the Periodic Table of Elements, and halogen radicals, or $(C_5H_{5-y-x}R_x)$ is a cyclopentadienyl ring in which two adjacent R-groups are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic ligand;

(JR'_{z-1-y}) is a heteroatom ligand in which J is an element with a coordination number of three from Group V-A or an element with a coordination number of two from Group VI-A of the Periodic Table of Elements, and each R' is, independently, a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals where one or more hydrogen atoms is replaced by a halogen atom, and z is the coordination number of the element J;

each Q is, independently, any univalent anionic ligand or two Q's together are a divalent anionic chelating ligand, provided that Q is different from ($C_5H_{5-y-x}R_x$);

Q' has the same meaning as Q;

y is 0 or 1 when w is greater than 0; y is1 when w is 0, when y is 1, T is a covalent bridging group containing a Group IV-A or V-A element; and

L is a Lewis base where w denotes, a number from 0 to 3;

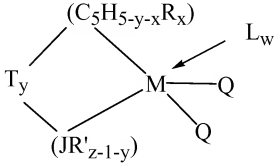
(B) an alumoxane,

wherein the olefin is styrene.

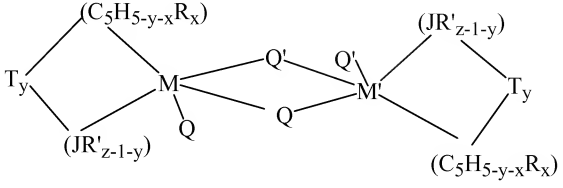
100. - 104. (Cancelled)

105. (Currently Amended) A process for the polymerization of one or more alpha olefins comprising conducting the polymerization in the presence of a catalyst system comprising:

(A) a Group IV B transition metal component of the formula:



or



wherein M is Zr, Hf or Ti;

M' has the same meaning as M;

$(C_5H_{5-y-x}R_x)$ is a cyclopentadienyl ring which is substituted with from zero to four substituent groups R, x is 0, 1, 2, 3 or 4 denoting the degree of substitution, wherein x is 0, 1, 2, ~~3or 4~~ 3 or 4 when M is Ti and x is 0, 1 or 3 when M is Hf or Zr, and each substituent group R is, independently, a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, C_1-C_{20} hydrocarbyl-substituted metalloid radicals wherein the metalloid is selected from the group IV A of the Periodic Table of Elements, and halogen radicals, or $(C_5H_{5-y-x}R_x)$ is a cyclopentadienyl ring in which two adjacent R-groups are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic ligand;

(JR'_{z-1-y}) is a heteroatom ligand in which J is an element with a coordination number of three from group V-A or an element with a coordination number of two from Group VI-

A of the Periodic Table of Elements, and each R' is a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals where one or more hydrogen atoms is replaced by a halogen radical, and z is the coordination number of the element J;
each Q is, independently, a univalent anionic ligand or two Q's together are a divalent anionic chelating ligand, provided that Q is different from $(C_5H_{5-X}R_X)$;

Q' has the same meaning as Q;

y is 1;

T is a covalent bridging group containing a Group IV-A or V-A element; and

L is a neutral Lewis base where w denotes the number 0 or 1;

(B) an alumoxane.

106. (Previously Presented) The process of claim 105 wherein each Q is, independently, a substituted or unsubstituted C_1-C_{20} hydrocarbyl, phosphide or arylphosphide radical, provided that Q is not a substituted or unsubstituted cyclopentadienyl ring, or both Q together are an alkylidene or a cyclometallated hydrocarbyl.

107. (Previously Presented) The process of claim 105 wherein the heteroatom ligand group J element is nitrogen, phosphorous, oxygen or sulfur.

108. (Previously Presented) The process of claim 105 wherein Q is substituted or unsubstituted C1 to C20 hydrocarbyl radical.

109. (Previously Presented) The process of claim 105 wherein the heteroatom ligand group J element is nitrogen.

110. (Previously Presented) The process of claim 105 wherein the mole ratio of Al:M is from 10:1 to 20,000:1.

111. (Previously Presented) The process of claim 105 wherein the alpha olefin is (1) ethylene, (2) propylene, (3) ethylene in combination with an alpha olefin having 3 to 20 carbon atoms, (4) propylene in combination with ethylene and/or C4 or higher alpha-olefins and diolefins, or (5) butene in combination with ethylene and/or C4 or higher alpha-olefins and diolefins.

112. (Previously Presented) The process of claim 105 wherein both Q are selected from the group consisting of: methyl, ethyl, propyl, butyl, amyl, isoamyl, hexyl, isobutyl, heptyl, octyl, nonyl, decyl, cetyl, 2-ethylhexyl, and phenyl.

113. (Previously Presented) The process of claim 105 wherein both Q are methyl.

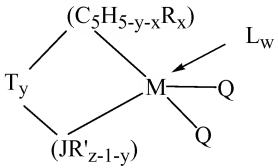
114. (Previously Presented) The process of claim 105 wherein both Q are selected from the group consisting of: diphenylphosphide, dicyclohexylphosphide, diethylphosphide, dimethylphosphide, methylidene, ethylidene and propylidene.

115. (Previously Presented) The process of claim 105 wherein the alpha olefin is ethylene.

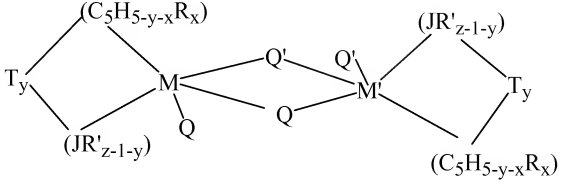
116. (Previously Presented) The process of claim 105 wherein the alpha olefin is propylene.

117. (Currently Amended) A process for the polymerization of one or more alpha olefins comprising conducting the polymerization in the presence of a catalyst system comprising:

(A) a Group IV B transition metal component of the formula:



or



wherein M Zr, Hf, or Ti;

M' has the same meaning as M;

$(C_5H_{5-y-x}R_x)$ is a cyclopentadienyl ring which is substituted with from zero to four substituent groups R, x is 0, 1, 2, 3 or 4 denoting the degree of substitution, wherein x is 0, 1, 2, ~~3or 4~~ 3 or 4 when M is Ti and x is 0, 1 or 3 when M is Hf or Zr, and each substituent group R is, independently, a radical selected from the group consisting of methyl, ethyl, propyl, butyl, octyl, benzyl, phenyl, trimethylgermyl, trimethylstannyl, triethylplumbyl, trifluoromethyl, trimethylsilyl, triethylsilyl, ethyldimethylsilyl, methyldiethylsilyl, and triphenylgermyl, or $(C_5H_{4-x}R_x)$ is a cyclopentadienyl ring in which two adjacent R substituents are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'z-1-y) is a heteroatom ligand selected from the group consisting of *t*-butylamido, phenylamido, p-*n*-butylphenylamido, cyclohexylamido, perfluorophenylamido, *n*-butylamido, methylamido, ethylamido, *n*-propylamido, isopropylamido, benzylamido, *t*-butylphosphido, ethylphosphido, phenylphosphido, and cyclohexylphosphido, and z is 3;

each Q selected is from the group consisting of hydride, methyl, ethyl, propyl, butyl, amyl, hexyl, heptyl, octyl, nonyl, decyl, cetyl, phenyl, chloro, bromo, fluoro, iodo, methoxy, ethoxy, propoxy, butoxy, phenoxy, methylphenoxy, dimethylamido, diethyolamido, methylethylamido,dibutylamido, dipropylamido, diphenylamido, diphenylphosphido, dicyclohexylphosphido, diethylphosphido, and dimethylphosphido;

Q' has the same meaning as Q;

y is 1;

T is selected from the group consisting of dialkyl, alkylaryl, or diaryl substituted silicon or germanium radicals, unsubstituted methylene and ethylene radicals;

L is a neutral Lewis base where w denotes the number 0 or 1; and

(B) an alumoxane,

118. (Previously Presented) The process of claim 117 wherein T is selected from the group consisting of dimethylsilyl, diethylsilyl, di-*n*-propylsilyl, diisopropylsilyl, di-*n*-butylsilyl, di-*t*-butylsilyl, di-*n*-hexylsilyl, methylphenylsilyl, ethylmethylsilyl, diphenylsilyl, *n*-hexylmethylsilyl, cyclopentamethylenesilyl, cyclotetramethylenesilyl, cyclotrimethylenesilyl, dimethylgermyl, and diethylgermyl.

119. (Previously Presented) The process of claim 117 wherein the process is solution process.

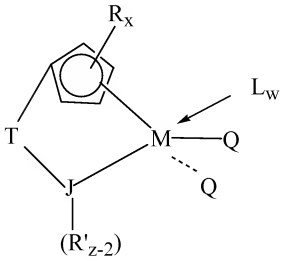
120. (Previously Presented) The process of claim 117 wherein the Group IV B transition metal component is dimethylsilyl(tetramethylcyclopentadienyl)(tert-butylamido) M dichloride, where M is titanium, zirconium or hafnium.

121. (Currently Amended) A process for polymerizing one or more olefins, diolefins or acetylenically unsaturated compounds comprising the steps of:

(i) contacting an olefin, diolefin or acetylenically unsaturated monomer at a temperature and pressure sufficient to polymerize such monomer with a catalyst system comprising:

(A) an alumoxane, and

(B) a Group IV-B transition metal component of the formula:



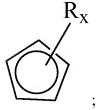
where M is Zr, Hf, or Ti;

R is a substituent group with X denoting the degree of substitution (x= 0, 1, 2, 3, or 4 wherein x is 0, 1, 2, ~~3or 4~~ 3 or 4 when M is Ti and x is 0, 1 or 3 when M is Hf or Zr) and each R is, independently, a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, an amido radical, a phosphido radical, an alkoxy radical, or any other radical containing Lewis acidic or basic functionality, C_1-C_{20} hydrocarbyl-substituted metalloid radicals wherein the metalloid is selected from the Group IV A of the Periodic Table of Elements, and halogen radicals, amido radicals, phosphido radicals,; alkoxy radicals, alkylborido radicals or a radical containing Lewis acidic or basic functionality, or at least two adjacent R-groups are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'$_{Z-2}$) is a heteroatom ligand in which J is an element with a coordination number of three from Group V-A or an element with a coordination number of two from Group VI-A, and R' is a radical selected from the group consisting of C_1-C_{20} hydrocarbyl

radicals, substituted C_1-C_{20} hydrocarbyl radicals where one or more hydrogen atoms is replaced by a halogen radical, an amido radical, a phosphido radical, an alkoxy radical, or a radical containing Lewis acidic or basic functionality, and z is the coordination number of the element J;

each Q is, independently, a univalent anionic ligand group or two Q's together are a divalent anionic chelating ligand, provided that Q is different from

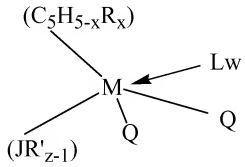


;

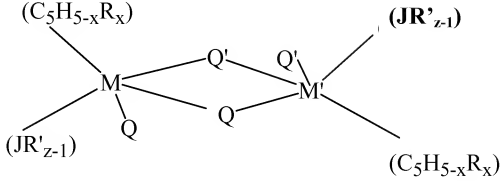
T is a covalent bridging group containing a Group IV-A or V-A elements; and L is a neutral Lewis base where w denotes a number from 0 to 3; and

(ii) recovering a polymer.

122. (Previously Presented) A compound having the general formula:



or



wherein M is Zr, Hf or Ti;

$(C_5H_{5-x}R_x)$ is a cyclopentadienyl ring which is substituted with from zero to five substituent groups R, x is 0, 1, 2, 3, 4 or 5 denoting the degree of substitution, and each substituent group R is, independently, a radical selected from the group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, C_1-C_{20} hydrocarbyl-substituted metalloid radicals wherein the metalloid is selected from the group IV A of the Periodic Table of Elements, and halogen radicals, or $(C_5H_{5-x}R_x)$ is a cyclopentadienyl ring in which two adjacent R groups are joined forming a C_4-C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand;

(JR'_{z-1}) is a heteroatom ligand in which J is an element with a coordination number of three from Group V-A or an element with a coordination number of two from Group VI-A of the Periodic Table of Elements, each R' is, independently, a radical

selected from a group consisting of C_1-C_{20} hydrocarbyl radicals, substituted C_1-C_{20} hydrocarbyl radicals where one or more hydrogen atoms is replaced by a halogen radical, and z is the coordination number of the element J;

each Q is, independently, selected from the group consisting of halogen, hydride and C_1-C_{20} hydrocarbyl, provided that Q is different from $(C_5H_{5-x}R_x)$;

L is a neutral Lewis base where "w" is a number greater than 0 and up to 3;

M' has the same meaning as M; and

Q' has the same meaning as Q.

123. (Previously Presented) The compound of claim 48 wherein J is oxygen.

124. (Previously Presented) The compound of claim 48 wherein J is nitrogen and R' is phenylamido, p-n-butylphenylamido, cyclohexylamido, perfluorophenyl amido, t-butyl phosphide, ethyl phosphido, phenyl phosphido, or cyclohexyl phosphido.

125. (Cancelled)

126. (Previously Presented) The compound of claim 48 wherein T is CR_2* or CR_2*CR_2*, where R* is selected from the group consisting of hydrogen, C_1 to C_{20}-alkyl, haloaklyl having up to a total of 20 carbon and halogen atoms, aryl having from 6 to 20 carbon atoms, and haloaryl having a total of from 7 to 20 carbon and halogen atoms.

127. (Previously Presented) The process of claim 88 wherein y is 1 and T is hydrocarbyl radical.

128. (Previously Presented) The process of claim 88 wherein y is 1 and T is CR_2* or CR_2*CR_2*, where R* is selected from the group consisting of hydrogen, C_1 to C_{20}-alkyl, haloaklyl having up to a total of 20 carbon and halogen atoms, aryl having

from 6 to 20 carbon atoms, and haloaryl having a total of from 7 to 20 carbon and halogen atoms.

129. (Previously Presented) The process of claim 88 wherein Q is selected from the group consisting of halogen, hydride and C_1-C_{20} hydrocarbyl.

130. (Previously Presented) The process of claim 88 wherein J is oxygen.

131. (Previously Presented) The process of claim 88 wherein J is nitrogen and R' is phenylamido, p-n-butylphenylamido, cyclohexylamido, perfluorophenyl amido, t-butyl phosphide, ethyl phosphido, phenyl phosphido, cyclohexyl phosphido.

132. (Previously Presented) The process of claim 88 wherein $(C_5H_{4-x}R_x)$ is fluorenyl, tetrahydroindenyl, or octahydrofluorenyl.

133. - 134. (Cancelled)